REMARKS/ARGUMENTS

Reconsideration of the above-identified patent application is respectfully requested in view of the foregoing amendments and following remarks. Claims 1, 18, and 19 have been amended. Claims 1 - 20 remain in the case.

The present invention provides an etchant which, when combined with disclosed microetching techniques, removes a small layer of copper from copper features forming part of a printed circuit board. The components of the novel etchant, many which have been used before, are used in a new combination. The resulting etchant works in combination with the disclosed and claimed etching so that large quantities of copper are not removed from copper features on a printed circuit board or similar structure. The copper is selectively removed in the present invention by applying an etchant comprising an inorganic acid, and persulfate and phosphate salts.

Claims 18 and 19 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claims 18 and 19 have been amended, thereby overcoming their rejection under 35 U.S.C. §112, second paragraph.

Claims 1, 2, 5, 6, 8, 9, and 13 were rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Published Unexamined Patent Application No. 05-148658 for ELECTROLESS TIN-PLATING METHOD, filed November 22, 1991 by Akio Takatsu et al. TAKATSU et al. has formed the basis for claims rejection throughout the prosecution of this application. The Examiner's rejection and Applicants' responses have all been based upon a computer-generated translation of the Japanese application which is a very poor translation. Applicants have taken it upon themselves to have a translation of TAKATSU et al. performed by a competent technical translator so as to better understand the disclosed subject matter. The newly-acquired translation is appended hereto as Exhibit A.

TAKATSU et al. disclose and claim a method for minimizing whisker growth after an electroless tin plating operation of TAB bonding structures for microelectronic devices. To minimize such whisker growth, TAKATSU et al. discovered that "it is considered that making the surface of the object smoothest as possible before application of tin plating is a most effective means of prevent the whisker prevention." (Appendix A, paragraph 0018, lines 9 - 11). Please note that all references herein to TAKATSU et al. are with regard to the translation provided in Appendix A unless otherwise indicated.

TAKATSU et al. describe a process wherein "the surface to be plated is treated with an admixture of acid, peroxide, and of organic high polymer compound before the electroless plating" (paragraph 0011, lines 5 - 6).

Further, TAKATSU et al. disclose details of the admixture, in which "at least one or more types selected out of sulfuric acid, hydrochloric acid, nitric acid, and phosphoric acid is preferably used. As to the peroxides, ammonium persulfate or hydrogen peroxide is preferably used. As to the organic high polymer compounds, a compound or its salt, wherein a straight chain hydrocarbon, or cyclical carbon compound or its derivative is bonded to a sulfuric acid group or a phosphoric acid group" (paragraph 0013, lines 2 - 7).

NOWHERE in the TAKATSU et al. specification does the term "phosphate" appear. There is indeed no teaching of an admixture containing ANYTHING beyond an acid, a peroxide, and an organic polymer. There is simply no teaching of the phosphate component of Applicants' mixture.

The differences between Applicants' disclosed and claimed formulation and that of TAKATSU et al. is understandable when the purposes of each are examined. TAKATSU et al. have discovered that a smooth surface minimizes whisker growth after an electroless tin plating operation. Consequently, a polymer component is added to their cleaning solution. The polymer fills in the pits left by the gross etching process of

their acid/peroxide formulation. In contradistinction, Applicants' formulation is adapted to microetch copper features and the smoothing function provided by the TAKATSU et al. polymer component is neither necessary nor desirable. However, the addition of the phosphate salt completely lacking in TAKATSU et al. apparently completes a formula wherein the etching rate is moderated to allow microetching without gross removal of copper from the copper features. The different desired functions of the TAKATSU et al. and Applicants' formulas have, indeed, resulted in significantly different formulations of their respective admixtures.

Phosphate is any component having a $-(PO_4)$ configuration, whereas phosphoric acid is also knows as H_3PO_4. The hydrogen radical H_3 in phosphoric acid is highly active and has a tendency to react with other components which is decidedly not desirable in Applicants' reaction.

Examiner's attention is drawn to the translation of paragraph 0013 as compared to the computer-generated translation heretofore relied upon. Applicants believe that the Exhibit A translation is more accurate. However, the original computer-generated translation included the term "phosphate group" for the actual component now translated as "phosphoric acid group". In context, a hydrocarbon is bonded to a radical of the "sulfuric acid group" or the "phosphoric acid group". This is certainly NOT the equivalent of a relatively non-active phosphate salt as Applicants recite in independent claims 1, 17, 19 and 20.

Because TAKATSU et al. fail to teach or suggest one of the three components of Applicants' admixture, clearly it may not properly be used as a 35 U.S.C. §(102) reference.

Applicants respectfully traverse the rejection of claims 1, 2, 5, 6, 8, 9, and 13 as being anticipated by TAKATSU et al.

Claims 14 - 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over TAKATSU et al. in view of United States Patent No. 6,281,090 for METHOD FOR THE MANUFACTURE OF PRINTED CIRCUIT BOARDS WITH PLATED RESISTORS, issued August 28, 2001 to Peter Kukanskis and United States Patent No. 4,774,491 for METAL FILM RESISTOR, issued September 27, 1988 to Ludovicus Vugts.

KUKANSKIS et al. teach a process whereby resistors may be manufactured integral with a printed circuit board by plating the resistors onto the insulative substrate.

VUGTS teaches a discrete (i.e., not formed on circuit substrate) metal film resistor utilizing resistive elements comprising Ni-Al.

As discussed hereinabove, the admixture of TAKATSU et al. differs completely from Applicants'. Adding the teachings of either KUKANSKIS et al. and/or VUGTS still fails to suggest the formulation used by Applicants in their microetching process. Neither KUKANSKIS et al. nor VUGTS adds the phosphate salt absent in TAKATSU et al. Absent this teaching, the limitations of claims 14 - 20 are believed to be only further limitations to allowable claims. Consequently, Applicants respectfully traverse their rejection under 35 U.S.C. §103(a) as being unpatentable over TAKATSU et al, in view of KUKANSKIS et al. and VUGTS.

Claims 3, 4, and 7 were rejected under 35 U.S.C. §103(a) as being unpatentable over TAKATSU et al, in view of United States Patent No. 4,238,279 for COMPOSITIONS AND METHODS FOR TREATING SURFACE OF LITHOGRAPHIC PRINTING PLATE, issued December 9, 1980 to Yasuo Tsubai et al. TSUBAI et al. teach a process useful in the printing industry and not necessarily, in the Applicants' opinions, in the semiconductor industry. Examiner Markoff states in the instant Official Action (page 5, section 8, line 10) that "Tsubai et al. teach that what is [sic] semiconductor industry meant under a general disclosure of phosphoric acid also included the claimed phosphate salts

and their mixtures with different phosphoric acids." Applicants question this statement as they have no way of knowing if TSUBAI et al. have any knowledge whatsoever of what is conventional in the semiconductor industry. TSUBAI et al. clearly disclose a lithographic plate treatment consisting essentially of three components: (a) phosphoric acids, (b) nitric acid or salts thereof, and nitrous acid or salts thereof. This teaches away from Applicants' claimed process and microetching solution in that Applicants clearly indicate that nitric acid is NOT suitable for use in their claimed process. Applicants clearly differentiate between phosphoric acid and a phosphate salt (claim 1) and do not interchange the terms. In applicant's proceeds and admixture, phosphoric acid and a phosphate salt perfrom entirely different function in the admixture. Phosphoric acid could not satisfactorily be substituted for a phosphate salt in the admixture.

Consequently, Applicants respectfully traverse the rejection of claims 3, 4, and 7 under 35 U.S.C. §103(a) as being unpatentable over TAKATSU et al. in view of TSUBAI et al.

Claims 10 - 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over TAKATSU et al. in view of United States Patent No. 5,855,805 for MICROETCHING AND CLEANING OF PRINTED WIRING BOARDS, issued January 5, 1999 to Nancy D. Arabinick. ARABINICK teaches a surfactant for use in a microetching and cleaning operation of a copper-plated printed circuit board. However, ARABINICK does not provide the addition of the basic phosphate salt as recited in Applicants' claim 1. Consequently, adding the teaching of ARABINICK to that of TAKATSU et al. still fails to either teach or suggest Applicants' microetchant formulation. Therefore, Applicants believe that claims 10 - 12 merely recite additional limitations to the allowable claims from which they depend and respectfully traverse their rejection under 35 U.S.C. §103(a) as being unpatentable over TAKATSU et al. in view of ARABINICK.

Applicants believe that claims 1 - 20 are now in condition for allowance. In view of the foregoing amendments and remarks, Applicants respectfully request that claims 1 - 20 be allowed and a timely Notice of Allowance be issued in this case.

Respectfully submitted,
SALZMAN & LEVY

By: _____

Mark Levy
Registration No. 29,188
Attorney for Applicants
SALZMAN & LEVY
Press Building - Suite 902
19 Chenango Street
Binghamton, New York 13901
Phone: (607) 722-6600

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:

Mail Stop _____
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

On 11/19/03 (Date of Deposit)

11/19/03 (Date)